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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,374	03/27/2001	Xiao-Dong Sun	RD-27727	3259

6147 7590 08/27/2003

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EXAMINER
MACCHIAROLO, PETER J

ART UNIT	PAPER NUMBER
2875	

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/681,374	SUN ET AL.	
	Examiner	Art Unit	
	Peter J Macchiarolo	2875	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25 and 39-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25 and 39-46* is/are rejected.

7)☒ Claim(s) *12 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *23 June 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. The reply filed on June 23, 2003 consists of changes to the specification, and remarks related to the prior rejection of claims in the Non-final Rejection dated April 3, 2003. However, claims 1-25, and 39-46 are not allowable as explained below.

Drawings

2. The changes to the drawings are accepted by the Examiner.

Claim Objections

3. Claims 12 and 18 are objected to because of the following informalities:

4. The claim structure used by Applicant does not conform to standard U.S. practice, and is difficult to interpret. Specifically, the claims do not clearly contain a preamble, a transitional word, or a main body. The multiple occurrences of the words "comprising" and "comprises" further inhibit proper comprehension of the claims' structures. See MPEP §608.01(m). The Examiner recommends the following claim structure:

[Preamble] [transitional word]:

[limitation X];

[limitation Y]; and

[limitation Z].

Appropriate correction is required.

Translated Reference

5. The Examiner has submitted herewith PTO/2003-4901, which is an English translation of JP 57-096453 published June 15, 1982 to Sugiyama, in order to assist Applicant understand Sugiyama's invention. It is now believed that a full understandable reference is provided.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-25, and 39-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugiyama (JP Pub. 57-096,453, "Sugiyama") in view of Lal (USPN 6,451,175; "Lal").

7. In regards to claims **1-2, 7, 12-13,** and **18**, Sugiyama discloses in figure 2, a gas discharge device with a composition for electron emitters comprising an electrically conductive material (1') coated with a mixture of carbon fibers (4) and alkaline-earth metal oxides (2).

8. Sugiyama is silent to the composition containing carbon nanotubes.

9. However, Lal teaches that carbon nanotubes can replace carbon fibers, thereby producing stronger and lighter compositions while maintaining excellent electrical properties[1]. Further, the Examiner takes Official Notice that carbon nanotubes have been recognized as an attractive electron-emitting alternative to carbon fibers at the time the time Applicant's invention was made.

10. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the composition of Sugiyama, including carbon nanotubes, since Lal teaches this configuration produces stronger and lighter compositions while maintaining excellent electrical properties.

11. The Examiner notes that the claim limitation "...wherein said carbon nanotubes are produced by a catalytic cracking and pyrolyzing of hydrocarbons" in claims 7 and 18, are drawn to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, the intermediate steps of the process, recited in claims **8-11** and **19-22**, are likewise not afforded patentable weight.

12. In regards to claim **3-4**, **14-15**, **39-40**, and **43-44**, Sugiyama and Lal teach all of the recited limitations of claims 1, and 12 (above).

13. Sugiyama is silent to an exact diameter of carbon nanotubes.

14. However, Lal teaches that the single walled carbon nanotubes known in the art can be adapted for a variety of applications and have a diameter of about $10nm^2$.

15. Although Lal is silent to the significance of this diameter, the Examiner takes Official Notice that this diameter of carbon nanotubes can be used to emit electrons efficiently.

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[1] Lal, column 1, lines 29-40.
[2] Lal, column 1, lines 11-16.

16. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the discharge device of Sugiyama, with the nanotubes of Lal, since these nanotubes can be used to emit electrons efficiently.

17. In regards to claims **5-6, 16-17, 41-42,** and **45-46**, Sugiyama and Lal teach all of the recited limitations of claims 2 and 13 (above).

18. Sugiyama and Lal are silent to the amount of carbon nanotubes that are needed in the composition to produce a workable electron stream for the gas discharge device.

19. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

20. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the gas discharge device of Sugiyama, with a proportion of carbon nanotubes in the composition being in a range from 30% to 90%, since discovering the optimum or workable ranges involves only routine skill in the art.

21. In regards to claims **23-25**, Sugiyama and Lal teach all of the recited limitations of claim 12 (above).

22. Sugiyama further teaches the invention pertains to an electrode for a fluorescent lamp.

23. Sugiyama and Lal are silent to the fluorescent lamp further comprising a background gas contained within at a pressure of less than about 0.3 kPa, and further comprising mercury vapor.

24. However, the Examiner takes Official Notice that a fluorescent lamp comprising mercury vapor and a background gas at a pressure of less than about 0.3 kPa is well known in the art.

25. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the fluorescent lamp of Sugiyama with the nanotubes of Lal, and further comprising mercury vapor and a background gas contained within at a pressure of less than about 0.3 kPa, since is well known in the art that this configuration is required for proper operation of a fluorescent lamp.

Response to Arguments

26. Applicant's arguments filed March 17, 2003 have been considered, but are moot in view of the new grounds of rejection, and the submitted translation of JP-57-096453 published June 15, 1982 to Sugiyama.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

28. U.S. 2002/0121856, published September 5, 2002, to Tsai claims priority to provisional application 60/272,945 filed March 2, 2001. Tsai discloses a fluorescent lamp having carbon nanotubes disposed on the cathode, which is nearly identical to Applicant's invention. However, this prior art is not relied upon in this Office Action.

29. U.S. 2002/0070648, published June 13, 2002 to Forsberg discloses a lamp having carbon nanotubes disposed on the cathode, which is nearly identical to Applicant's invention. However, this reference does not qualify as prior art and is therefore not relied upon in this office action.

30. U.S. Patent 6,239,547 to Uemura et al is evidence that carbon nanotubes having a diameter of about 10nm can be used to efficiently emit electrons.

31. U.S. Patent 6,294,867 to Lynn is evidence that a gas discharge device comprising mercury vapor and a background gas at a pressure of less than about 0.3 kPa is known in the art.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Macchiarolo whose telephone number is (703) 305-7198. The examiner can normally be reached on 7.30 - 4:30, M-F.

33. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703) 305-4939. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

34. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

pjm
August 18, 2003

THOMAS M. SEMBER
PRIMARY EXAMINER

THOMAS M. SEMBER
PRIMARY EXAMINER